

### SUPPORT FOR THE AMENDMENT

This Amendment amends Claims 1, 3-5 and 8-13; and adds new Claim 21. Support for the amendments is found in the specification and claims as originally filed. In particular, support is found in the specification at least at [0035] (total-Li content of "9 ppm" and "6 ppm"). No new matter would be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-21 will be pending in this application. Claim 8 is independent. Claims 1-7 are withdrawn from consideration pursuant to a restriction requirement.

### REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and reexamination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on September 11, 2008.

As discussed at the personal interview, the present invention is directed to a high-cleanliness steel having high fatigue strength and high cold workability. This is achieved by controlling the total-Li content of the steel to a specified range in order to limit the number of oxide inclusion particles having a major diameter of 20  $\mu\text{m}$ . Specification at [0001], [0012], [0021].

The skilled artisan knows that with regards to oxide inclusion particles the term "major diameter" refers to the extent of an oxide inclusion particle along its greatest dimension. (Note, e.g., that the term "major diameter" in the field of design engineering can be defined as "the largest diameter of a screw thread, measured at the crest for an external (male) thread and at the root for an internal (female) thread." McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition, page 1203 (copy attached)).

Claims 8-20 are rejected under 35 U.S.C. 103(a) over JP63-140068 ("JP-068") in view of JP2002-167647 ("JP-647"), JP2002-194497 ("JP-497") and JP2003-027184 ("JP-184").

JP-068 fails to suggest the independent Claim 8 limitation of a "steel having a total-Li content between 0.020 and 9 ppm by mass". The Office Action at Page 4, line 11, admits that "JP '068 **does not teach the presence of lithium** or limiting inclusions to less than 20  $\mu\text{m}$  using a 50 gram sample." (Emphasis added).

The secondary references fail to remedy the deficiencies of JP-068.

JP-647 discloses a steel containing inclusions containing 0.5 to 10%  $\text{R}_2\text{O}$ , where R is Na, K and Li. English-language machine translation of JP-647 at page 1.

JP-497 discloses steel produced by performing slag refining, the slag containing 10% or less of at least one of  $\text{Na}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{Li}_2\text{O}$  and  $\text{ZrO}_2$ . English-language machine translation of JP-497 at page 1.

JP-184 is silent about Li.

The Office Action asserts:

While JP '647 does not specifically provide the end Li concentration in the steel in ppm, one would reasonably [sic] expect a concentration overlapping the claimed range as the inclusion  $\text{Li}_2\text{O}$  content is in the range claimed in dependent claims 10 and 13. Office Action at page 6, lines 10-12.

Claim 10 reads as follows:

10. The high-cleanliness steel according to claim 8, wherein each of the oxide inclusion particles has a  $\text{CaO}$  content between 15 and 55% by mass, a  $\text{SiO}_2$  content between 20 and 70% by mass, an  $\text{Al}_2\text{O}_3$  content of 35% by mass or below, a  $\text{MgO}$  content of 20% by mass or below and a  $\text{Li}_2\text{O}$  content between 0.5 and 20% by mass.

Claim 13 reads as follows:

13. The high-cleanliness steel according to claim 10, wherein each of the oxide inclusion particles contains  $\text{Na}_2\text{O}$  and/or  $\text{K}_2\text{O}$  and the sum of  $\text{Li}_2\text{O}$  content,  $\text{Na}_2\text{O}$  content and  $\text{K}_2\text{O}$  content is between 0.5 and 20% by mass.

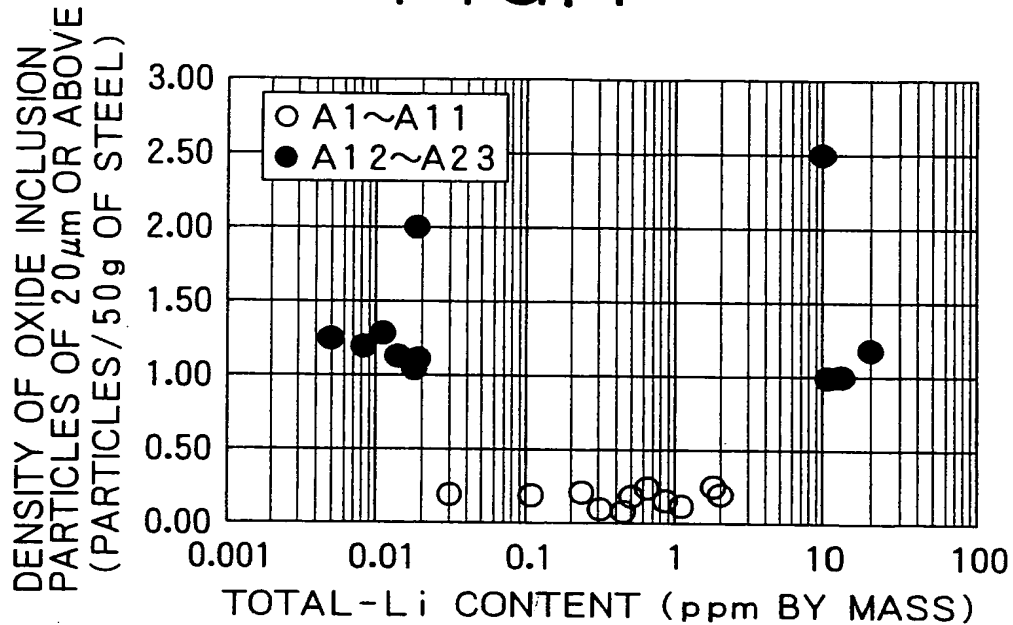
Pursuant to MPEP §§ 2144.02 and 2144.03, Applicants respectfully request that the Examiner provide the technical basis for the Office Action's apparent assertion that a concentration of  $\text{Li}_2\text{O}$  in a metal oxide inclusion in a steel suggests a concentration of Li in the steel.

The secondary references are silent about the amount of inclusions appearing in steel. The skilled artisan cannot determine the Li content of a steel if the skilled artisan only knows the Li concentration in the inclusions in the steel but does not know the amount of inclusions in the steel.

Applicants submit that the cited prior art does not, expressly or inherently (i.e., necessarily), suggest the independent Claim 8 limitation of a "steel having a total-Li content between 0.020 and 9 ppm by mass". Thus, the claims are not *prima facie* obvious over the cited prior art.

Any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant reduction in density of oxide inclusion particles of 20  $\mu\text{m}$  or above (particles/50g of steel) that is achieved by the present invention over the independent Claim 8 range of "a total-Li content between 0.020 and 9 ppm by mass" and over the Claim 21 range of "a total-Li content between 0.020 and 6 ppm by mass". This is demonstrated in the specification at Fig. 1, reproduced below:

FIG. 1



The data used to prepare Fig. 1 is found in the attached Declaration Under 37 CFR 1.132.

The cited prior art is silent about the significant reduction in density of oxide inclusion particles of 20 μm or above (particles/50g of steel) that is achieved by the present invention over the independent Claim 8 range of "a total-Li content between 0.020 and 9 ppm by mass" and over the Claim 21 range of "a total-Li content between 0.020 and 6 ppm by mass". The reduction in density of these oxide inclusion particles over these ranges of total-Li content provides the steel with improved cold workability and fatigue characteristics. Thus, any *prima facie* case of obviousness based on the cited prior art is rebutted.

Because the cited prior art fails to suggest all the limitations of independent Claim 8, and any *prima facie* case of obviousness based on the cited prior art is rebutted, the rejection under 35 U.S.C. 103(a) should be withdrawn.

Pursuant to MPEP 821.04(b), after independent product Claim 8 is allowed, Applicants respectfully request rejoinder, examination and allowance of withdrawn method Claims 1-7, which include all of the limitations of product Claim 8.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration and prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Attached:

McGraw-Hill Dictionary of Scientific and Technical Terms, Fifth Edition, page 1203  
Declaration Under 37 CFR 1.132

changes in the atmosphere. Also known as permanent thermocline. { 'mān 'thərmə,kli:n }

**maize** [BOT] *Zea mays*. Indian corn, a tall cereal grass characterized by large ears. { māz }

**Majac mill** [MIN ENG] A mill for dry-grinding mica by means of fluid energy; consists of a chamber which contains two horizontal, directly opposing jets and into which mica is fed continuously from a screw conveyor. { 'mā-jək ,mil }

**Majidae** [INV ZOO] The spider, or decorator, crabs, a family of decapod crustaceans included in the Brachyura; members are slow-moving animals that often conceal themselves by attaching seaweed and sessile animals to their carapace. { 'maj-ə,dē }

**Majorana effect** [OPTICS] The effect in which a transverse magnetic field acting on a colloidal solution, such as a sol of iron oxide, produces optical anisotropy, resulting in magnetic birefringence. { mā-jə'ran-ə i,fekt }

**Majorana force** [NUC PHYS] A force between two nucleons postulated to explain various phenomena, which can be derived from a potential containing an operator which exchanges the nucleons' positions but not their spins. { ,mā-jə'ran-ə ,fōrs }

**Majorana neutrino** [PARTIC PHYS] A particle described by a wave function that satisfies the Dirac equation with mass equal to zero, and that is self-charge-conjugate. { ,mā-jə'ran-ə nū'trē-nō }

**major arc** [MATH] The longer of the two arcs produced by a secant of a circle. { 'mā-jər 'ār:k }

**major assembly** [ENG] A self-contained unit of individual identity; a completed assembly of component parts ready for operation, but utilized as a portion of, and intended for further installation in, an end item or major item. { 'mā-jər ə'sem-blē }

**major axis** [MATH] The longer of the two axes with respect to which an ellipse is symmetric. { 'mā-jər 'ak-səs }

**major combination** [ORD] A single composite unit of mechanical equipment inherently complete for independent use and consisting of one or more major items; as issued, it is complete in respect to both equipment and spare parts, including items furnished by services other than the issuing service; for example, a tank, complete with armament, equipment, and spare parts. { 'mā-jər ,kām-bə'nā-shən }

**major cycle** [COMPUT SCI] The time interval between successive appearances of a given storage position in a serial-access computer storage. { 'mā-jər 'sī-kəl }

**major defect** [IND ENG] Defect which causes serious malfunctioning of a product. { 'mā-jər 'dē,fekt }

**major depression** [PSYCH] A type of affective disorder characterized by major episodes of depression without intervening manic episodes. { 'mā-jər di'presh-ən }

**major diameter** [DES ENG] The largest diameter of a screw thread, measured at the crest for an external (male) thread and at the root for an internal (female) thread. { 'mā-jər di'am-əd-ər }

**major diatonic scale** [ACOUS] A diatonic scale in which the relative sizes of the sequence of intervals are approximately 2,2,1,2,2,2,1. { 'mā-jər 'dī-ə'tan-ik 'skāl }

**major fog signal** [NAV] A sound signal which has a normal range of reception in excess of 2 miles (3.2 kilometers), to aid watercraft in avoiding obstacles. { 'mā-jər 'fäg ,sig-nəl }

**major fold** [GEOL] A large-scale fold with which minor folds are usually associated. { 'mā-jər 'fōld }

**major gene** [GEN] Any gene individually associated with pronounced phenotypic effects. { 'mā-jər 'jēn }

**major histocompatibility complex** [IMMUNOL] In vertebrates, a family of genes that encode cell surface glycoproteins that regulate interactions among cells of the immune system, some components of the complement system, and perhaps other related functions connected with intercell recognition. Abbreviated MHC. { 'mā-jər ,hi-stō-kəm'pad-ə'bil-əd-ē 'kām,pleks }

**major hysteria** [PSYCH] A conversion reaction manifested in movements that suggest a generalized convulsion. { 'mā-jər hi'ster-ē-ə }

**major immunogene complex** [IMMUNOL] A genetic region containing loci that code for lymphocyte surface antigens, histocompatibility antigens, immune response gene products, and proteins of the complement system. Abbreviated MIC. { 'mā-jər ,ə'myū-nə-jēn 'kām,pleks }

**major item** [ORD] An end item, a group of end items individually classified by the responsible technical service, or an assembled group of items as procured or issued for a specific

tactical role, excluding combinations required to complete the assigned tactical mission. { 'mā-jər 'tī-dəm }

**majority** [MATH] A logic operator having the property that if P, Q, R are statements, then the function (P, Q, R, ...) is true if more than half the statements are true, or false if half or less are true. { mō'jār-əd-ē }

**majority carrier** [ELECTR] The type of carrier, that is, electron or hole, that constitutes more than half the carriers in a semiconductor. { mō'jār-əd-ē 'kar-ē-ər }

**majority element** See majority gate. { mō'jār-əd-ē 'el-ə-mənt }

**majority emitter** [ELECTR] Of a transistor, an electrode from which a flow of minority carriers enters the interelectrode region. { mō'jār-əd-ē i'mid-ər }

**majority gate** [COMPUT SCI] A logic circuit which has one output and several inputs, and whose output is energized only if a majority of its inputs are energized. Also known as majority element; majority logic. { mō'jār-əd-ē 'gāt }

**majority logic** See majority gate. { mō'jār-əd-ē 'lāj-ik }

**major joint** See master joint. { 'mā-jər 'jōint }

**major key** [COMPUT SCI] The primary key for identifying a record. { 'mā-jər ,kē }

**major light** [NAV] A light of high candlepower and reliability exhibited from a fixed structure ashore or on a marine site (except range lights). { 'mā-jər 'līt }

**major lobe** [ELECTROMAG] Antenna lobe indicating the direction of maximum radiation or reception. Also known as main lobe. { 'mā-jər 'lōb }

**major node** [ELEC] A point in an electrical network at which three or more elements are connected together. Also known as junction. { 'mā-jər 'nōd }

**major operation** [MED] An extensive, difficult, and potentially dangerous surgical procedure, usually requiring general anesthesia. { 'mā-jər ,äp-ə'rā-shən }

**major planet** [ASTRON] Any of the four planets that are larger than earth: Jupiter, Saturn, Neptune, and Uranus. { 'mā-jər 'plan-ət }

**major relay station** [ELECTR] Tape relay station which has two or more trunk circuits connected thereto to provide an alternate route or to meet command requirements. { 'mā-jər 'rē,lä ,stā-shən }

**major repair** [ENG] Repair work on items of material or equipment that need complete overhaul or substantial replacement of parts, or that require special tools. { 'mā-jər ri'per }

**major trough** [METEOROL] A long-wave trough in the large-scale pressure pattern of the upper troposphere. { 'mā-jər 'trōf }

**major wave** See long wave. { 'mā-jər 'wāv }

**make** [ELEC] Closing of relay, key, or other contact. { 'māk }

**make-and-break circuit** [ELEC] A circuit that is alternately opened and closed. { 'māk ən 'brāk ,sərkət }

**make-break operation** [COMMUN] A circuit operation in which there is a cessation of current flow as a pulse transmission occurs. { 'māk 'brāk ,äp-ə'rā-shən }

**make-busy** [COMMUN] A switch whose activation makes a dial telephone line or group of telephone lines appear to be busy and thereby prevents completion of incoming calls. { 'māk 'biz-ē }

**make contact** [ELEC] Contact of a device which closes a circuit upon the operation of the device (normally open). { 'māk ,kän,takt }

**makeready** [GRAPHICS] 1. The careful leveling of relief printing plates on the bed of the press so that they yield the best possible impression. 2. Final preparations and adjustments that must be made preliminary to printing, especially those that are required to compensate for irregularities in type or plates. { 'māk ,red-ē }

**make the land** [NAV] To sight and approach or reach land from seaward. { 'māk thə 'land }

**makeup** [GRAPHICS] The arrangement of lines of type and art into pages or sections of suitable length. { 'mā,kəp }

**makeup air** [ENG] The volume of air required to replace air exhausted from a given space. { 'māk ,əp ,er }

**makeup gas** [PETRO ENG] Gas injected into a reservoir to maintain a constant pressure, thus preventing retrograde condensation. { 'māk ,əp ,gas }

**makeup time** [COMPUT SCI] The time required to rerun programs on a computer because of operator errors and other problems. { 'māk ,əp ,tīm }

**On the cover: Photomicrograph of crystals of vitamin B<sub>1</sub>.  
(Dennis Kunkel, University of Hawaii)**

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In addition, material has been drawn from the following references: R. E. Huschke, *Glossary of Meteorology*, American Meteorological Society, 1959; *U.S. Air Force Glossary of Standardized Terms*, AF Manual 11-1, vol. 1, 1972; *Communications-Electronics Terminology*, AF Manual 11-1, vol. 3, 1970; W. H. Allen, ed., *Dictionary of Technical Terms for Aerospace Use*, 1st ed., National Aeronautics and Space Administration, 1965; J. M. Gilliland, *Solar-Terrestrial Physics: A Glossary of Terms and Abbreviations*, Royal Aircraft Establishment Technical Report 67158, 1967; *Glossary of Air Traffic Control Terms*, Federal Aviation Agency; *A Glossary of Range Terminology*, White Sands Missile Range, New Mexico, National Bureau of Standards, AD 467-424; *A DOD Glossary of Mapping, Charting and Geodetic Terms*, 1st ed., Department of Defense, 1967; P. W. Thrush, comp. and ed., *A Dictionary of Mining, Mineral, and Related Terms*, Bureau of Mines, 1968; *Nuclear Terms: A Glossary*, 2d ed., Atomic Energy Commission; F. Casey, ed., *Compilation of Terms in Information Sciences Technology*, Federal Council for Science and Technology, 1970; *Glossary of Stinfo Terminology*, Office of Aerospace Research, U.S. Air Force, 1963; *Naval Dictionary of Electronic, Technical, and Imperative Terms*, Bureau of Naval Personnel, 1962; *ADP Glossary*, Department of the Navy, NAVSO P-3097.

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